

Team 2: AIRS Only Retrievals

Sung-Yung Lee, Evan Manning,
John Blaisdell, Joel Susskind,
Chris Barnett, Mitch Goldberg,
Chuck Cho, Dave Staelin, Bill Blackwell

Sung-Yung Lee
California Institute of Technology
Jet Propulsion Laboratory

Pasadena, California
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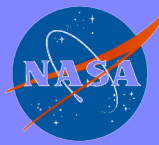
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Introduction

- AIRS only retrieval is not only a risk reduction for failure of AMSU, but also important because NWP centers are reluctant to assimilate AMSU twice
- Options
 - Dirty regression followed by IR only retrieval
 - Clear only retrieval
 - Use NCEP forecast as first guess
 - Stochastic cloud clearing without AMSU
 - Neural Network Retrieval
 - Single footprint retrieval
- How many and which AMSU channels can we lose before exercising IR only option
 - AMSU tends to lose one channel at a time
- Propagation of error estimates with these options
- QA Flag update
 - Effort to modify PGE to use MW channels only during MW-only-algorithm stalled due to questions on QA.



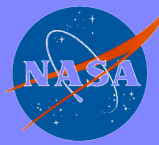
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Team Members and Roles

- Evan Manning, Sung-Yung Lee
 - PGE implementation, testing, clear filter
- Barnet, Goldberg
 - Cloudy regression, GFS/AVN guess
- Susskind, Blaisdell
 - S/W implementation at GSFC
- Staelin, Cho
 - Stochastic Cloud Clearing without AMSU
- William Blackwell
 - Neural Network Retrieval



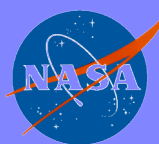
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Purpose of AIRS Only Retrieval

- Risk reduction for failure of AMSU
 - Need minimum of two months to modify software and deliver it to DAAC
- NWP centers are reluctant to use AMSU data twice:
 - once directly and second time indirectly through AIRS retrieval
 - Just an excuse to delay assimilation of retrievals?
- We need to study
 - Which AMSU channels are critical for cloud clearing
 - AMSU tends to lose channels due to increased noise
 - How much noise we can endure?
 - Is AMSU important after MW only retrieval?



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History of AMSU in Orbit

- Design life of AMSU-A is four years
 - With the exception of NOAA-17, all copies can be used for cloud clearing.
- NOAA-K/15 was launched in May 1998, currently backup AM
 - Noisy AMSU-B due to interference from STX1 (deactivated in Nov 1998)
 - AMSU-14 failed in Oct 2000
 - AMSU-11 failed in April 2002
- NOAA-L/16 was launched in Sept 2000, 2:PM Ascending orbit
 - AMSU-8 degrading
- Aqua was launched in May 2002, 1:30 PM Ascending
 - Noisy AMSU-9, failed temperature sensors on AMSU-A1
 - HSB failed in Feb 2003 (scan motor)
- NOAA-M/17 was launched in June 2002
 - AMSU 7 became noisy in Jan 2003, lost by March 2003
 - AMSU-A1 powered off in Oct 2003 (scan motor failure)
- NOAA-N to be launched in May 11, 2005
- METOP-2 to be launched in 2006
- NOAA-N' to be launched in Dec 2007(?)



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Cloudy Regression

- Estimate clear geophysical parameter by cloud contaminated radiance
- Regression algorithm is identical to regression that uses cloud cleared radiance
- Has been tested at NESDIS/NRT
- Can we get error estimate and estimate of cloudiness?
- Would it work better with clear flag?
- What changes do we need in final cloud clearing and final retrieval?
 - Can we iterate cloud clearing without AMSU?



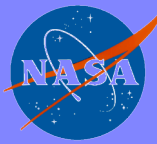
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NCEP Forecast as Guess

- JPL has most of the software modules necessary for using NCEP guess
 - Team software already reads and uses NCEP forecast surface pressure, capable of reading other parameters
 - The software modules to do temporal/spatial/vertical interpolation of forecast already exist in simulation
- C Barnet implemented this option at NESDIS



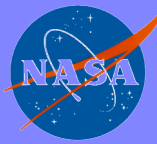
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Hole Hunting

- Clear flag due to Aumann is implemented in “Clear Match PGE”
 - Relatively good global coverage, valid over land and water, day and night
- This can be easily ported to level 2 PGE
- Hole hunting can be complemented by cloudy regression when thin cloud is leaked through



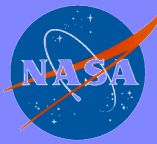
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Stochastic Cloud Clearing

- Presentation by Cho and Staelin was very encouraging
 - Can be modified not to use AMSU
- JPL needs the prototype software to perform independent testing
- This can be modified for AMSU-less cloud clearing
- Can this be considered for version 5?



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Single Footprint Retrieval

- U Wisc is developing retrieval algorithm for International MODIS/AIRS Processing Package (IMAPP) for direct broadcasting community.
 - We need further information



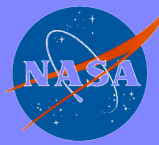
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Neural Network Retrieval

- William Blackwell



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Plan for V5: Discussion Session

- What is the time line?
 - How many options can be implemented, tested and compared?
- Reduce the number of options
 - Prioritize the options
 - Which options are practical for V5?
- Possible Priorities
 - Cloudy Regression followed by a physical retrieval
 - Clear only retrieval, regression and physical retrieval
 - NCEP forecast first guess followed by a physical retrieval
 - Stochastic cloud clearing followed by physical retrieval